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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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10/689,771

10/21/2003

Charles E. Wickersham JR.

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4535

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12/10/2007

EXAMINER

MCDONALD, RODNEY GLENN

ART UNIT

PAPER NUMBER

1795

MAIL DATE

DELIVERY MODE

12/10/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary

Application No.	Applicant(s)	
10/689,771	WICKERSHAM ET AL.	
Examiner	Art Unit	
Rodney G. McDonald	1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
 - If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
 - Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 24 September 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-63 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 1-42 is/are allowed.
- 6) ☒ Claim(s) 43-63 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☐ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date _____
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____

DETAILED ACTION

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 43-45, 51-57, 59, 62 and 63 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintaku et al. (Japan 01-052065) in view of Hunt et al. (U.S. Pat. 5,836,506).

Regarding claim 43, Shintaku et al. teach a sputter target assembly. The target assembly has a member (i.e. backing plate) having a bonding side with a plurality of projections. A member (i.e. target) having a bonding side with a plurality of grooves. The plurality of grooves is filled with the plurality of projections. The target and the backing plate are bonded by solder. (See Abstract; Figs. 1-3)

Regarding claim 44, Shintaku et al. teach the member having the grooves is the target and the member having the projections is the backing plate. (See Abstract; Figs. 1-3)

Regarding claim 52, the solder is disposed on at least a portion of the projections because it bonds the target to the backing plate. (See Abstract)

Regarding claim 53, the solder is disposed on at least a portion of the grooves because it bonds the target to the backing plate. (See Abstract)

Regarding claim 54, the solder is disposed on at least a portion of the bonding side of the member having projections because it bonds the target to the backing plate. (See Abstract)

Regarding claim 55, the solder is disposed on at least a portion of the bonding side of the member having grooves because it bonds the target to the backing plate. (See Abstract)

Regarding claim 62, Shintaku et al. teach projections in the form of cylinders, cones, cubes, pyramids. (See Figs. 1-3)

Regarding claim 63, Shintaku et al. teach grooves that match the shape of the corresponding projections. (See Figs. 1-3)

The differences between Shintaku et al. and the present claims is that the member having the grooves being a metal having a melting point higher than that of the metal which comprises the projections is not discussed (Claim 43), the plurality of grooves being substantially filled by the at least one projection such that the members are at least mechanically bonded together is not discussed (Claim 43), wherein at least one of

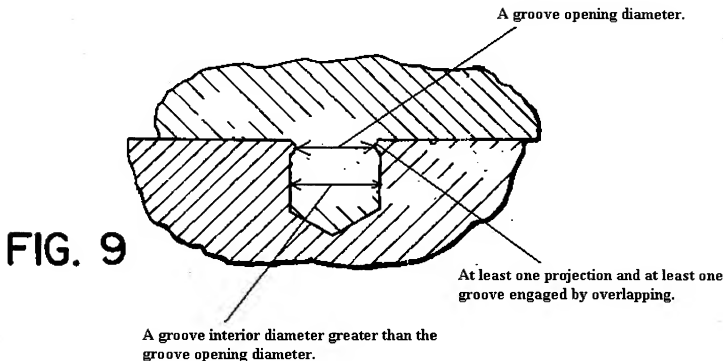
the plurality of grooves comprises a groove having a groove opening diameter and a groove interior having a groove interior diameter wherein the groove interior diameter is greater than the groove opening diameter is not discussed (Claim 43), the at least one projection and the at least one groove engaged by overlapping is not discussed (Claim 43), the member having the grooves is the backing plate and the member having the projections is the target is not discussed (Claim 45), the members being bonded or joined by an interlocking bond and/or mechanical joint is not discussed (Claim 51), the member having the grooves being cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, zirconium, hafnium, silver, gold or alloys thereof is not discussed (Claim 56), the member having the grooves comprises tantalum or alloys thereof is not discussed (Claim 57) and the member having the projections being cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, zirconium, hafnium, silver, gold or alloys thereof is not discussed (Claim 59).

Regarding the member having the grooves being a metal having a melting point higher than that of the metal, which comprises the projections (Claim 43), Hunt et al. teach that the target can be titanium and the backing plate is aluminum. (Column 8 lines 29) Hunt et al. teach the target can have holes drilled in it for bonding to the backing plate. (Column 6 lines 13-34)

Regarding the plurality of grooves being substantially filled by the at least one projection such that the members are at least mechanically bonded together (Claim 43), Hunt et al. teach the grooves being substantially filled by the at least one projection

such that the members are at least mechanically bonded together. (Column 6 lines 27-34)

Regarding wherein at least one of the plurality of grooves comprises a groove having a groove opening diameter and a groove interior having a groove interior diameter wherein the groove interior diameter is greater than the groove opening diameter (Claim 43), Hunt et al. teach that at least one of the plurality of grooves comprises a groove opening diameter and a groove interior having a groove interior diameter wherein the groove interior diameter is greater than the groove opening diameter. (See Fig. 9; See Fig annotated below)



Regarding the at least one projection and the at least one groove engaged by overlapping (Claim 43), as shown above in the annotated Fig. 9 Hurwitt teach at least one projection and at least one groove engaged by overlapping. (See Fig. 9)

Regarding the member having the grooves is the backing plate and the member having the projections is the target (Claim 45), Hunt et al. suggest that either surface can have the grooves and the projections. (Column 6 lines 13-15)

Regarding the members being bonded or joined by an interlocking bond and/or mechanical joint (Claim 51), Hunt et al. teach the grooves being substantially filled by the at least one projection such that the members are at least mechanically bonded together. (Column 6 lines 27-34)

Regarding the member having the grooves being cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, zirconium, hafnium, silver, gold or alloys thereof (Claim 56), Hunt et al. teach that the target can be titanium and the backing plate be aluminum. (Column 8 lines 29) Hunt et al. teach the target can have holes drilled in it for bonding to the backing plate. (Column 6 lines 13-34)

Regarding the member having the grooves comprises tantalum or alloys thereof (Claim 57), Hunt et al. teach that the target can be titanium and the backing plate be aluminum. (Column 8 lines 29) Hunt et al. teach the target can have holes drilled in it for bonding to the backing plate. (Column 6 lines 13-34) Hunt et al. further suggest the target can be tantalum. (Column 8 lines 19-23)

Regarding the member having the projections being cobalt, titanium, copper, aluminum, tantalum, niobium, nickel, zirconium, hafnium, silver, gold or alloys thereof

(Claim 59), Hunt et al. teach that the target can be titanium and the backing plate be aluminum. (Column 8 lines 29) Shintaku et al. teach that the backing plate can have the projections. (See Shintaku et al. Abstract)

The motivation for utilizing the features of Hunt et al. is that it allows for producing a target that is resistant to shear failure. (Column 4 lines 39-42)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have modified Shintaku et al. by utilizing the features of Hunt et al. because it allows for producing a target that is resistant to shear failure.

Claims 46-48, 60 and 61 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintaku et al. in view of Hunt et al. as applied to claims 43-45, 51-57, 59, 62 and 63 above, and further in view of Ivanov et al. (WO 00/15863).

The differences not yet discussed is the a gap existing between a portion of the bonding sites is not discussed (Claim 46), the width of the gap is not discussed (Claim 47), the portion of bonding sides in contact is not discussed (Claim 48), the member having projections comprising a copper-chromium or copper-zinc alloys is not discussed (Claim 60) and the projections being of irregular shape is not discussed.

Regarding claim 46, the bond is formed such that a gap is formed between at least a portion of the bonding side of the target member and a portion of the bonding side of the backing member. (See Figs.4-6; The peripheral edge where there is a material interposed between a portion of the bonding side of the target member and a portion of the bonding side of the backing member. This results in a gap between the two members.)

Regarding claim 47, the gap is less than 0.1 inch. (Page 9 lines 4-6)

Regarding claim 48, a portion of the bonding sides are in contact. (Figs. 4-6)

Regarding claim 60, the member having the projections can comprise copper-chromium. (Page 7 lines 13-17; Page 9 lines 10-11)

Regarding claim 61, the projections can be irregular in shape. (See Fig. 3)

The motivation for utilizing the features of Ivanov et al. is that it allows for bonding a sputtering target to a backing plate. (See Abstract)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Ivanov et al. because it allows for bonding a sputtering target to a backing plate.

Claims 49 and 50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Shintaku et al. in view of Hunt et al. as applied to claims 43-45, 51-57, 59, 62 and 63 above, and further in view of Wegmann (U.S. Pat. 4,983,269).

The difference not yet discussed is the use of a cell. (Claims 49, 50)

Regarding claims 49, 50, Wegmann teach forming a cell member having a plurality of sides where the cell member is proximate to the interface of the target and the backing plate. (See Fig. 8) One of the cell sides can constitute a portion of the bonding side of the backing plate. (See Fig. 8) A gas can be disposed inside the cell, which can be the same as the sputtering process atmosphere. (Column 4 lines 1-22) The gas can be at any pressure including atmospheric. (Column 4 lines 4-10)

The motivation for providing a cell is that it allows for detecting erosion. (Column 3 lines 23-27)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized the features of Wegmann because it allows for detecting erosion of the targets.

Claim 58 is rejected under 35 U.S.C. 103(a) as being unpatentable over Shintaku et al. in view of Hunt et al. as applied to claims 43-45, 51-57, 59, 62 and 63 above, and further in view of Ohhashi et al. (U.S. Pat. 5,693,203).

The difference not yet discussed is the use of niobium (claim 58).

Regarding claim 58, Ohhashi et al. teach a target made of niobium. (Column 6 line 4)

The motivation for utilizing a target of niobium is that it allows for depositing films of niobium. (Column 6 line 4)

Therefore, it would have been obvious to one of ordinary skill in the art at the time the invention was made to have utilized a niobium target as taught by Ohhashi et al. because it allows for depositing films of niobium.

Allowable Subject Matter

Claims 1-42 are allowed.

The following is a statement of reasons for the indication of allowable subject matter:

Claims 1-42 are allowable over the prior art of record because the prior art of record does not teach a method of forming a sputtering target assembly comprising a backing member and a target member including slidably contacting a portion of at least one projection with a portion of at least one groove effective to generate frictional heat

that softens and deforms the at least one projection; and partially fill said at least one groove, which said at least one deformed projection upon cooling and hardening thereby forming at least a mechanical bond between the target member and the backing member, wherein said member having said grooves is a metal having a melting point higher than that of the metal which comprises the projections.

Response to Arguments

Applicant's arguments filed September 24, 2007 have been fully considered but they are not persuasive.

In response to the argument that Shintaku et al. fail to teach a configuration that mechanically interlocks with any groove in target material whereby the protrusions of the plate and an opening in the target material are engaged by overlapping, it is argued that the secondary reference to Hunt et al. teach the feature of mechanical interlocking with the protrusion and an opening by overlapping. (See Hunt et al. discussed above)

In response to the argument that Shintaku fails to teach target material having a melting point higher than that of the metal backing plate, it is argued that Hunt et al. teach the target material having a melting point higher than that of the metal backing plate. (See Hunt et al. discussed above)

In response to the argument that Shintaku fails to teach the at least one of the plurality of grooves comprising a groove opening having a groove opening diameter and a groove interior having a groove interior diameter, it is argued that Hunt teach a groove opening having a groove opening diameter and a groove interior having a groove interior diameter. (See Hunt et al. Fig. 9; annotated Fig. 9 above)

In response to the argument that Hunt et al. does not teach groove opening diameter to be smaller than a groove interior diameter, it is argued that Hunt teach a groove opening having a groove opening diameter and a groove interior having a groove interior diameter. (See Hunt et al. Fig. 9; annotated Fig. 9 above)

In response to the argument that Ivanov teach away from the present invention, it is argued that Ivanov was relied upon to teach the secondary features of the claims. The primary references suggest the claimed invention.

In response to the argument that Wegmann does not make up for the deficiencies of Shintaku and Hunt et al., it is argued that Shintaku and Hunt et al. teach the features of the claims as described above. (See Shintaku and Hunt et al. discussed above)

In response to the argument that Ohhashi et al. does not make up for the deficiencies of Shintaku et al. and Hunt et al., it is argued that Shintaku and Hunt et al. teach the features of the claims as described above. (See Shintaku and Hunt et al. discussed above)

Conclusion

THIS ACTION IS MADE FINAL. Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the

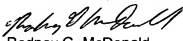
Art Unit: 1795

shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rodney G. McDonald whose telephone number is 571-272-1340. The examiner can normally be reached on M-Th with every Friday off..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Nam X. Nguyen can be reached on 571-272-1342. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.


Rodney G. McDonald
Primary Examiner
Art Unit 1795

RM
December 5, 2007